

**5 METHOD AND APPARATUS FOR PROVIDING MULTIPLE TILE SHAPES OR
APPEARANCES OF SAME**

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims the full benefit and priority of pending U.S. provisional patent application serial no. 60/441,336, filed January 21, 2003, entitled "Single Tile Having Two Piece Appearance". The present application also claims the full benefit and priority of pending U.S. provisional patent application serial no. 60/423,971, filed November 4, 2002, entitled "Method And Apparatus For Providing Multiple Tile Shapes From A Single Tile". The present application claims the full benefit and priority 10 and is a continuation-in-part (CIP) of pending U.S. Non-Provisional Patent Application Serial No. 10/347,663 filed January 21, 2003 entitled "Single Tile Having Two Piece Appearance". The entire contents of the aforementioned two provisional patent 15 applications and one non-provisional patent application are incorporated by reference.

20 BACKGROUND OF THE INVENTION

Various methods have been employed for making concrete tiles, such as concrete roof tiles. The particular methods used depend on such things as the shape of the tiles being formed. Typically, wet concrete is dispensed onto a moving pallet (a.k.a. "mold"), 25 following which the pallet is passed under a roller and slipper to form and then shape the tile. A knife assembly chops and shapes the opposite edges of the tile. The wet concrete is cured and then removed from the pallet to provide the completed tile.

In a particular known method of making concrete roof tiles, a conveyor is used to 30 transport the wet concrete from either a continuous mixer or a batch mixer to a making head assembly disposed above a conveyor containing a succession of moving pallets, arranged end-to-end. The pallets define the general shape of the tiles to be formed. As each pallet passes within the making head assembly, wet concrete is dispensed onto the pallet, with the help of a rotating roller which meters the concrete onto the pallet and 35 compresses the wet concrete to a desired thickness. The pallet is then passed beneath a slipper which engages the wet concrete and has a profile selected to provide the concrete

- 5 with a desired cross-sectional configuration. A knife assembly chops the continuous ribbon of concrete formed on the end-to-end succession of pallets to define the individual tiles and to shape the edges thereof. The pallets with the wet concrete extruded, compressed, shaped and chopped thereon are then separated and advanced to a racker, where the pallets are loaded onto racks for transport to a curing facility. The curing
- 10 facility typically comprises an oven in which the tiles are heated at a desired temperature and for a desired period of time to cure the concrete. Following that, each concrete tile is removed from its supporting pallet to thereby provide the completed concrete tiles.

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BRIEF SUMMARY OF THE INVENTION

Generally described, one embodiment of the invention includes the use of an S-Tile mold, including or combined with a scoring, knifing, shaping, or other type of process, which allows for subsequent controlled separation of what would normally be an S-Tile into two separate tile sections having a general C-shaped cross section. This
10 allows for two types of tiles (S-tiles and Two-Piece Mission tiles) to be made from one type of mold (S-tile).

Another embodiment of the invention includes the use of an S-Tile mold, including or combined with a scoring, knifing, shaping, coloring, or other type of process,
15 which allows for an S-Tile to be produced which appears to be two separate tile sections having a general C-shaped cross section, but in fact is a one piece element.

Another configuration of the present invention includes the use of an S-Tile mold, combined with a scoring, knifing, shaping, coloring, or other type of process, which
20 allows for an S-Tile to be produced which appears to be two separate tile sections having a general C-shaped cross section, but in fact is a one piece element. However, this one piece element may be split itself if the need arises.

Therefore it is an object of the present invention to provide an improved method
25 and apparatus for providing roof tiles.

It is a further object of the present invention to provide an improved roof tile and system for using same.

30 Other objects, features, and advantages of the present invention will become apparent upon reading the following detailed description of the preferred embodiment of the invention when taken in conjunction with the drawing and the appended claims.

5 **BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)**

Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

Fig. 1 is a pictorial view of a "modified" S-tile 5, which includes sections 6 and 7. Also provided is a rectangular-type channel 9. This channel may be used as a breakage 10 channel (to separate sections 6 and 7), or to simulate a dual-tile configuration (appearing to be two separate files). Exemplary nail holes NH1 and NH2 are also shown. This figure also shows optional items NH3 and score line (or channel) 99.

Fig. 2 is an end view of the tile of Fig. 1. Exemplary support ribs, barely shown in Fig. 1, are better shown as 6R and 7R in this figure. In this preferred embodiment, two 15 substantially parallel ribs are used as a pair, with one each of each pair shown in Fig. 2. These ribs are also shown in Fig. 6; note a pair is used at one end and a single rib is used at the other end.

Fig. 3A is a pictorial view of a modified slipper design 30 configured for use with the invention.

20 Fig. 3B are illustrative views of possible blade shapes.

Fig. 4 is a pictorial view of a plurality of Two-Piece Mission tiles.

Fig. 5 is a tile 5 according to one embodiment of the present invention, showing nail holes NH1 and NH2, and showing a Head End "H.E." and a Tail End "T.E."

Fig. 6 is the underside of that shown in Fig. 5.

25 Fig. 7 is a more detailed view of the tile 5 of Fig. 5, showing in more detail the location of channel 9.

Fig. 8 is an illustrative drawing of the channel shown in Fig. 7. Partial cross hatching is shown.

30 Fig. 9 is an illustrative drawing of alternate channels 9ALT. Partial cross hatching is shown.

Fig. 10 is a partial tail (a.k.a., "butt") end view of an alternate tile 110 having an alternate shape of an interface. As may be seen an overhang is provided which defines a single substantially flat shelf portion 1000.

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DETAILED DESCRIPTION OF THE INVENTION

The present inventions now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, these inventions may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these 10 embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

General Description

Generally described, the invention includes several different embodiments or 15 concepts. These embodiments could be thought of as including the following three general categories:

- S-Tile molding including separation “treatment” and breakage
- S-Tile molding including separation “treatment” and no breakage
- 20 - S-Tile molding including separation “treatment” and breakage or no breakage, as needed.

The term separation “treatment” is used to describe scoring, knifing, shaping, coloring, or another type of process, which allows for an S-Tile (a.k.a. “Espana”) to be 25 produced which appears to be two separate tile sections having a general C-shaped cross section (a.k.a. “Mission”) and/or which can actually be separated or “broken” into two tile sections.

Category One

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General

This category includes the use of a conventional S-Tile mold, combined with a scoring/knifing or other type of process, which allows for subsequent controlled 35 separation of what would normally be an S-Tile into two separate tile sections having a

5 general C-shaped cross section (a.k.a. Two-Piece Mission Tiles). This allows for two types of tiles (S-tiles and Two-Piece Mission tiles) to be made from one type of mold (S-tile).

More Details

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Reference is first made to Figure 1, which is a pictorial view of a “modified” S-title 5, which includes sections 6 and 7. Also provided is a separation channel 9. It should be understood that under one embodiment of the invention, this tile shape would not be installed as a whole on a roofing structure, but would be broken as noted below.

15 However, under another embodiment this tile shape could be so installed as a whole. As described elsewhere, after curing, the tile 5 is intended to be broken along channel 9 so that two Two-Piece Mission tile shapes are provided, corresponding to sections 6 and 7.

20 Referring now also to Fig. 2, which is an end view of the tile of Fig. 1, the channel 9 is 3/16 inch wide, and 5/32 deep, although other configurations are contemplated without departing from the spirit and scope of the present invention. In an alternate configuration, a knife edge could be used instead of the formed channel.

25 It should be understood that under one embodiment of the invention, a “shading” treatment could be applied, which involves the use of a small jet to squirt suitable ink onto the score line, as shown generally on the surface 9S in Fig. 2. It should be understood that this a “shading” treatment could be applied to any of the embodiments of the invention as needed.

30 It should be understood that a “conventional” S-title is such as shown in Figs. 1 and 2, but without the channel 9 (or knife cut 99).

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Manufacturing

The overall manufacturing process is as follows. Conventional S-type tiles can be made as needed in a conventional S-tile mold (not shown), with occasionally the modified S-tiles 5 being made. In one example, out of 40,000 tiles being made, the last 10-15% could be modified S-tiles. However, other manufacturing ratios may also be provided without departing from the spirit and scope of the present invention, and may be easily varied as needed to accommodate demand.

15 The conventional S-tiles will be manually or automatically de-palleted from the mold as is presently done in the art.

In order to “switch over” to Two-Piece Mission type tiles, under one version of the invention, the line is stopped and the slipper configuration is changed. Reference is 20 now made to Fig. 3A, which is a pictorial view of a modified slipper design 30, which includes a scoring blade 39, which is configured to form the channel 9 during the forming process. In one configuration the scoring blade is 5/32 inches high, 3/16 inches wide, and 1.5 inches in length, although other configurations are contemplated without departing from the spirit and scope of the present invention. Fig. 3B shows various possible scoring 25 blade configurations 39A, 39B, 39C.

As noted above, under the first embodiment of the invention, in order to use the slipper configuration in Fig. 3, the line has to be stopped and the slippers exchanged. However, an alternative invention includes the concept of configuring the slipper to allow 30 the blade 39 to be moved up and down such that it scores as desired in one position, but presents a flat surface flush with the slipper in a second position. Another alternative configuration includes not modifying the slipper at all but simply lowering a tool into place downstream of the slipper; this could be done while the line is going.

5 The tile **5** will be allowed to cure as all other tiles. It will then be hand de-palleted from the mold, broken along the score line and packaged as two separate pieces.

Installation

10 The smaller tiles **6** and **7** can be installed such as shown in Fig. 4, which shows a plurality of Two-Piece Mission tiles installed on a demonstration surface.

Category Two

15 General Description

Generally described, this embodiment invention includes the use of an S-Tile mold, combined with a scoring, knifing, and or coloring process, which allows for an S-Tile to appear as two separate tile sections having a general C-shaped cross section, by use of a "simulation interface channel" **9**. These tile sections having a general C-shaped cross section may also be known as "mission tiles".

More Detailed Discussion

Reference is first made to Figure 5, which is a pictorial view of a "modified" S-tile **5**, which includes portions **6** and **7**, and defines a head end **HE** and a tail end **TE**.
25 Also provided is a channel **9**. It should be understood that under one embodiment of the invention this tile shape is intended for installation as a whole on a roofing structure, simulating two cooperating mission tile shapes.

30 Fig. 6 is the underside of that shown in Fig. 5.

Fig. 7 is a more detailed view of the tile **5** of Fig. 5, showing in more detail the channel **9**.

5 Referring now also to Fig. 8, the channel can be 3/16 inch wide, and 5/32 deep, although other configurations are contemplated without departing from the spirit and scope of the present invention, especially if such other configurations are found more structurally and/or aesthetically effective or desirable. This simulation interface channel 9 simulates the interface of two separate tiles corresponding to portions 6 and 7. It should
10 be understood that this channel may also be painted, colored, or otherwise darkened in order to accent a "shadow" effect which causes the eye to better perceive separation of the two portions 6 and 7.

Manufacturing Considerations

15 The overall manufacturing process can be as follows. Conventional S-type tiles can be made as needed in a conventional S-tile mold (not shown), with occasionally the modified S-tiles 5 being made. In one example, out of 40,000 tiles being made, the last 10-15% could be modified S-tiles. However, other manufacturing ratios may also be
20 provided without departing from the spirit and scope of the present invention, and may be easily varied as needed to accommodate demand.

The conventional S-tiles will be manually or automatically de-palleted from the mold as is presently done in the art.

25 In order to "switch over" to Simulated Two-Piece Mission type tiles, under one version of the invention, the line is stopped and the slipper configuration is changed. Reference is now made to Fig. 18, which is a pictorial view of a modified slipper design 30, which includes a scoring blade 39, which is configured to form the channel 9 during
30 the forming process. In one configuration the scoring blade is 5/32 inches high, 3/16 inches wide, and 1.5 inches in length, although other configurations are contemplated without departing from the spirit and scope of the present invention.

5 As noted above, under the first embodiment of the invention, in order to use the
slipper configuration in Fig. 3, the line has to be stopped and the slippers exchanged.
However, an alternative invention includes the concept of configuring the slipper to allow
the blade 39 to be moved up and down such that it scores as desired in one position, but
presents a flat surface flush with the slipper in a second position. Another alternative
10 configuration includes not modifying the slipper at all but simply lowering a tool into
place downstream of the slipper; this could be done while the line is going.

Curing and Installation

15 The tile 5 will be allowed to cure as all other tiles, and can be installed in the
same manner as a conventional S-tile. However, should the need arise, the channel could
be used as a break line should the installer need a half tile width at the end of a course of
tiles.

20 Alternatives

There are many alternative channel configurations which may be used. The rectangular channel may be used as shown in Fig. 8, or alternative channel shapes such as shown in Fig. 9 or 10 may be used. Knife cuts could also be used.

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Category Three

The present invention also contemplates the use of tiles such as described above
which can be used as either a "breaking" tile or a non-breaking tile, purely at the decision
30 of the installer.

5 Variations

Under another variation, a portion of the cap part of the S tile is installed on top of a cap on a regular S tile, which could be considered a "boosted" tile. This gives the appearance of an "old world" installation. Reference is made back to Fig. 1. Under this 10 version, the same channel 9 as before is provided. However there is also applied a second channel or knife cut 99 to the cap portion of the S tile perpendicular to the length of the tile and about 3-1/2" from the top of the tile, although other lengths may be provided without departing from the spirit and scope of the present invention. This knife cut is provided by a transverse knife edge coming down from above at a suitable location. An 15 additional nail hole NH3 is also applied in the cap portion of the tile approximately 4" from the top (although this could also be varied). The knife cut only cuts about halfway through the concrete and acts like a perforation. When the tile is de-palleted and loaded on the roof, the roofer breaks the tile down the middle using the first score line (or channel). Then he breaks the top off using the perforation/score line of the second knife 20 cut. The remaining piece (the one with the nail hole NH3) can then be installed on top of the cap of an installed S tile with mortar to give it an "old" look. The additional nail hole NH3 is for a wire clip to provide a mechanical attachment, as well as the mortar.

In this alternate configuration as may be seen there will be three tile members 25 provided after the double breaking process; a long pan piece, a medium length cap piece, and a short cap piece. The long pan piece may be used as a course starter, and the shortest piece may be used either as a double boost element (stacking even higher on top of the medium length piece) or as needed in a hip stack environment.

30 It should be understood that other tile profiles could be used without departing from the spirit and scope of the present invention. For example, other types of back-supporting ribs could be used. Knife cuts could be used to provide channels such as 9.

5 It should also be understood that etching or any type of chemical/fluid treatment
could be used to provide the breakage line (a.k.a. "breakage treatment"). However, this
would need to be done after the tile has cured.

Conclusion

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Many modifications and other embodiments of the inventions set forth herein will
come to mind to one skilled in the art to which these inventions pertain having the benefit
of the teachings presented in the foregoing descriptions and the associated drawings.
Therefore, it is to be understood that the inventions are not to be limited to the specific
15 embodiments disclosed and that modifications and other embodiments are intended to be
included within the scope of the appended claims. Although specific terms are employed
herein, they are used in a generic and descriptive sense only and not for purposes of
limitation.